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# 7.1.3 Wood Products

Wood products have the potential to be among our greenest building materials. After all, the primary energy source going into the production of wood fiber is the sun—through photosynthesis. If we could be confident that the forests from which we derive our wood products were well managed, wood would be an obvious environmental choice. Along with considering the source of wood, we should also consider how efficiently the wood is used and—with manufactured products—whether harmful offgassing could occur.

## Opportunities

Wherever wood is being used in a building, there is an opportunity to advance good forest management by specifying certified wood products. When wood is being used for framing—more common in residential and light commercial buildings—there is an opportunity to utilize this resource in a more efficient manner than usual, and there is opportunity to influence how effectively the building envelope will be insulated. With the specification of manufactured wood products—from subflooring to furniture—there is opportunity to influence the indoor air quality of the completed building by selecting products made with binders that release little or no formaldehyde.

## Technical Information

**Forest certification:** The best way to ensure that wood used in a building is from well-managed forest operations is to specify third-party-certified wood. Currently the only way to ensure that wood being used in a building is from a well-managed forest is to insist on certification based on standards developed by the Forest Stewardship Council (FSC). This independent forest certification program was founded in 1992 to encourage more responsible forestry and provide a mechanism for buyers of wood to influence forestry through their purchasing decisions. FSC developed international standards for responsible forest management and set up a program to accredit companies or organizations that would actually certify forest operations.

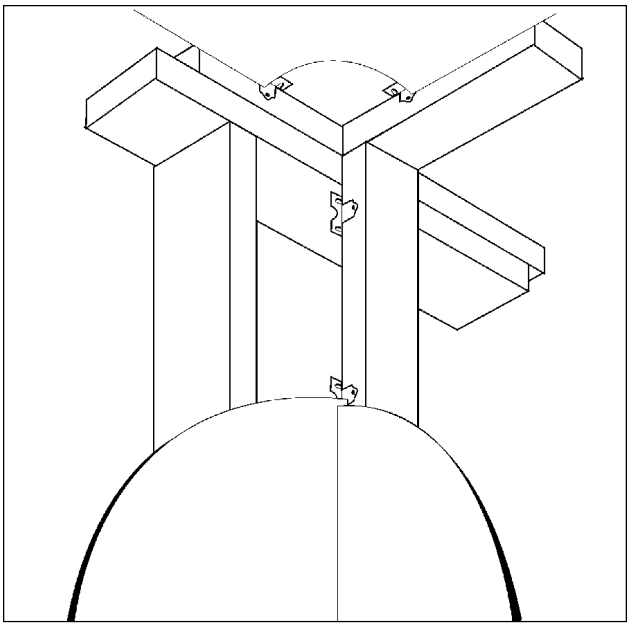
At present there are two U.S. organizations accredited by FSC to certify forests: SmartWood, of Burlington, Vermont, and Scientific Certification Systems, Inc., of Oakland, California. This certification process involves bringing outside forestry experts in to examine how the forest is being managed, then rating it. FSC standards also provide for chain-of-custody certification for tracking wood from FSC-certified forest operations so that buyers can be assured that labeled wood products have actually come from well-managed forests. At the end of 1999 there were 4.9 million acres (2 million ha) of FSC-certified private and public forest in the United States, and 44 million acres (17.8 million ha) worldwide.


*The Forest Stewardship Council developed criteria for forest certification and chain-of-custody certification of forest products. This logo is used on FSC-certified products.*

**Using wood efficiently:** While the source of wood is very important from an environmental standpoint, so too is the efficiency with which we use it. In residential and light-commercial buildings, wood-frame construction is very common. A typical house uses roughly 15,000 board feet (35.4 $m^3$) of wood in the framing lumber, plywood, particleboard, trim, and millwork. Nationwide, some 35 billion board feet (82.6 million $m^3$) of framing lumber is used annually, according to the U.S. Census Bureau.

*Advanced framing* is a building technique that makes more efficient use of lumber. Sometimes referred to as "optimal-value engineering," this system differs from conventional framing significantly: it features wider spacing of wall studs, fewer studs at corners, single top plates with trusses aligned directly above wall studs, and less lumber around door and window openings. Combined, these advanced framing techniques can reduce wood use by 25% or more, while improving the energy performance of insulated walls and roofs (because insulation insulates better than wood). Supporting drywall corners with drywall clips instead of nailing or screwing them into the framing also reduces cracking—one of the most common causes of callbacks for builders.

**Engineered wood products:** Another way builders are using wood fiber more efficiently is through the use of engineered lumber products. Instead of using large-dimension, solid-wood framing members, engineered wood is made by taking small pieces of wood and gluing them together into structural products. The first such product was plywood, introduced around



Adapted from *NY-STAR Builder's Field Guide*

*Wood use in framing can be minimized by installing drywall stops at the ceiling, at exterior corners, and where interior partitions meet exterior walls.*

1900. Glue-laminated beams (glulams) appeared soon after. Newer products, including oriented strand board (OSB), wood I-joists, laminated-veneer lumber, parallel-strand lumber, and laminated-strand lumber, carry these ideas further. Wood I-beams, made largely from small-diameter, low-grade trees such as aspen, are now used in over 60% of homes, where they are lighter, stronger, more dimensionally stable, and faster to install than solid dimension lumber.

**Formaldehyde emissions:** Manufactured wood products, including plywood, OSB, engineered lumber, particleboard, and medium-density fiberboard (MDF), require binders to hold veneers, strands, or particles of wood together. Three types of binders are commonly used in these products: phenol formaldehyde, urea formaldehyde, and polymeric methyl diisocyanate (PMDI), a type of polyurethane.

Of these, urea formaldehyde, used in interior-grade products (particleboard, MDF, paneling, and hardwood plywood) releases the greatest amount of formaldehyde, a suspected carcinogen and known respiratory irritant. While manufacturers have succeeded in dramatically reducing formaldehyde emissions from urea formaldehyde binders in recent decades, this is still a significant concern, especially among people with chemical sensitivities. Phenol formaldehyde binder, used in most exterior-grade structural manufactured wood products, locks up the formaldehyde much more tightly than does urea formaldehyde, so significantly less formaldehyde is released, but it still occurs. Only PMDI releases no formaldehyde. Although PMDI is quite toxic at the manufacturing plant, once cured it is highly stable.

☑ Straw Particleboard: Among manufactured "wood" products, one of the greenest isn't made of wood at all—but of straw, an agricultural waste product. Until recently, most straw was burned in the fields, but that practice has been banned in many areas because of air pollution and safety concerns. Only a portion of the straw can be plowed back into the ground without robbing the soil of nitrogen. As a result, a huge quantity of straw is available. Some of it is being turned into high-quality particleboard suitable for furniture and other applications in which wood particleboard and MDF are typically used. All straw particleboard is made with PMDI resins that do not release formaldehyde.

## References

*Cost-Effective Home Building: A Design and Construction Handbook*, NAHB Research Center, Upper Marlboro, MD, 1994.

*Efficient Wood Use in Residential Construction: A Practical Guide to Saving Wood, Money and Forests*, Natural Resources Defense Council, New York, NY, 1998.

ForestWorld.com, Inc., Colchester, VT. Offers a useful Web site with extensive discussion of forest certification issues and links to more than 6,000 other forest industry-related sites; www.forestworld.com.

"Straw: The Next Great Building Material?", *Environmental Building News*, Vol. 4, No. 3, May/June 1995, BuildingGreen, Inc., Brattleboro, VT; (800) 861-0954; www.Building Green.com.

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